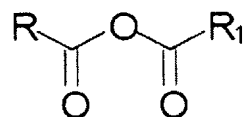


Rejections Under 35 U.S.C. §103

A. Li and Vaca-Garcia

The Office Action rejects claims 1-3, 5, 7-12, 14 and 15 under 35 U.S.C. §103(a) over Li et al., "Chemical modification of wood by anhydrides without solvents or catalysts," ("Li") in view of Vaca-Garcia et al., "Cellulose esterification with fatty acids and acetic anhydride in lithium chloride/N,N-dimethylacetamide medium," ("Vaca-Garcia"). Applicants respectfully traverse the rejection.

Claim 1 recites "[a] process for chemical treatment of at least one lignocellulose material, comprising: impregnating the lignocellulose material with a chemical agent comprising hydrocarbonaceous chains: wherein: the agent comprises a mixed anhydride, given by the formula:



where R is a hydrocarbonaceous chain derived from a C₂ to C₄ carboxylic acid and R₁ is a hydrocarbonaceous chain derived from a C₆ to C₂₄ fatty acid, except that when R is a hydrocarbonaceous chain derived from acetic acid, R₁ is not a hydrocarbonaceous chain derived from benzoic acid; and the agent is capable of providing covalent grafting of a plurality of the hydrocarbonaceous chains to the lignocellulose material" (emphasis added). Li and Vaca-Garcia do not disclose or suggest such a process.

As discussed previously, it is undisputed that Li fails to disclose or suggest treating wood pieces with a mixed anhydride. In Vaca-Garcia, an agent comprising mixed anhydrides covalently grafts a plurality of hydrocarbonaceous chains to cellulose extracted from a lignocellulose material – nowhere in Vaca-Garcia is a mixed anhydride applied to a lignocellulosic material, i.e., a solid material composed both of lignin and cellulose. Vaca-

Garcia does not remotely disclose or suggest treating cellulose within lignocellulosic material. Thus, neither Li nor Vaca-Garcia discloses or suggests treating lignocellulosic material with a mixed anhydride.

The Office Action asserts that it would have been apparent to one of ordinary skill in the art that the mixed anhydrides of Vaca-Garcia could be used to treat a lignocellulose material as in Li. Applicants submit that the neither reference suggests that the mixed anhydrides of Vaca-Garcia could be used to treat a lignocellulose material as in Li. As the Board of Patent Appeals and Interferences has stated, "[t]he *KSR* Court noted that obviousness cannot be proven merely by showing that the elements of a claimed device were known in the prior art; it must be shown that those of ordinary skill in the art would have had some 'apparent reason to combine the known elements in the fashion claimed.'" *Ex parte Whalen*, 89 USPQ2d 1078, 1084 (Bd. Pat. App. & Int. 2008). The apparent reasons for employing a mixed anhydride to treat a lignocellulose material identified in the Office Action are not supported by the teachings of the cited references – Vaca-Garcia only suggests treating isolated cellulose in a solvent system that is destructive to wood. Starting from the teachings of Li, a skilled artisan intending to enhance the durability and dimensional stability of a lignocellulose material would not have been led to replace the anhydrides of Li with the mixed anhydrides of Vaca-Garcia.

A *prima facie* case of obviousness has not been made.

However, even if a *prima facie* case were made, such case is rebutted by the results shown in the Declaration Under 37 C.F.R. §1.132 ("Declaration") submitted herewith – "[a] *prima facie* case of obviousness ... is rebuttable by proof that the claimed compounds possess unexpectedly advantageous or superior properties." See MPEP §2144.09 (citing *In re Papesch*, 315 F.2d 381 (C.C.P.A. 1963)). The Examples of the Declaration demonstrate that

a piece of wood treated according to claim 1 exhibits unexpectedly superior properties in comparison to a piece of wood treated according to Li, the closest cited reference.

As can be seen from the results in the TABLE of the Declaration, employing a mixed anhydride (acetic/octanoic anhydride) as a treatment agent provides superior penetration in comparison with employing acetic anhydride as a treatment agent. *See Declaration*, paragraph 8. That is, the mixed anhydride treats wood much more efficiently than acetic anhydride: the mixed anhydride provides a full, deep treatment (50 mm penetration), while acetic anhydride penetrates only the surface (2 mm penetration). *See Declaration*, paragraph 8. The greater penetration by the mixed anhydride employed in the process of claim 1 of the present patent application in comparison with acetic anhydride as employed in the method of Li is an unexpected result. *See Declaration*, paragraph 8.

As can also be seen from the results in the TABLE above, employing a mixed anhydride as a treatment agent provides much lower wettability in comparison with employing acetic anhydride as a treatment agent. *See Declaration*, paragraph 9. The outer face of the sample treated with the mixed anhydride exhibited a lower wettability (89° contact angle) in comparison to the outer face of the sample treated with acetic anhydride (46° contact angle – a nearly two-fold increase in wettability). *See Declaration*, paragraph 9. The inner face of the sample treated with the mixed anhydride exhibited a lower wettability (78° contact angle) in comparison to the inner face of the sample treated with acetic anhydride (18° - a nearly two-fold increase in wettability). *See Declaration*, paragraph 9. Due, at least in part, to the differing penetrations of the mixed anhydride and acetic anhydride, the sample treated with the mixed anhydride showed similar (low) wettability for the outer and inner faces, while the sample treated with acetic anhydride showed much higher wettability for the inner face in comparison with the outer face. *See Declaration*, paragraph 9. The sample treated with the mixed anhydride substantially retains its wettability on both the inner and

outer faces after ageing. *See* Declaration, paragraph 9. By contrast, the sample treated with acetic anhydride exhibits increased wettability on the outer face after aging. *See* Declaration, paragraph 9. The sample treated with the mixed anhydride is more resistant to ageing than the sample treated with acetic anhydride. *See* Declaration, paragraph 9. The lower wettability and higher stability exhibited by the sample treated with the mixed anhydride employed in the process of claim 1 of the present patent application in comparison with acetic anhydride as employed in the method of Li is an unexpected result. *See* Declaration, paragraph 9.

These results are objective evidence of the improvements of the process of claim 1 over known processes as in Li, and thus these results rebut any suggestion that it would have been obvious to modify the processes of Li in view of the teachings of Garcia-Vaca.

As explained, claim 1 would not have been rendered obvious by Li and Vaca-Garcia. Claims 2, 3, 5, 7-12, 14 and 15 depend from claim 1 and, thus, also would not have been rendered obvious by Li and Vaca-Garcia. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

B. Li, Vaca-Garcia and Mahieu

The Office Action rejects claim 13 under 35 U.S.C. §103(a) over Li in view of Vaca-Garcia and EP 0 190 576 A1 to Mahieu ("Mahieu"). Applicants respectfully traverse the rejection.

For the reasons discussed above, Li and Vaca-Garcia fail to disclose or suggest each and every feature of claim 1. Mahieu does not remedy the deficiencies of Li and Vaca-Garcia. Mahieu is cited for its alleged disclosure of treating wood elements by spraying. *See* Office Action, pages 8 to 9. However, Mahieu, like Li and Vaca-Garcia, fails to disclose or suggest a method in which a lignocellulose material is treated with a mixed anhydride

including a hydrocarbonaceous chain derived from a C₂ to C₄ carboxylic acid and a hydrocarbonaceous chain derived from a C₆ to C₂₄ fatty acid. Accordingly, the combination of references fails to disclose or suggest each and every feature of claim 1.

As explained, claim 1 would not have been rendered obvious by Li, Vaca-Garcia and Mahieu. Claim 13 depends from claim 1 and, thus, also would not have been rendered obvious by Li, Vaca-Garcia and Mahieu. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

C. Li, Vaca-Garcia and Dawson

The Office Action rejects claim 19 under 35 U.S.C. §103(a) over Li in view of Vaca-Garcia and Dawson et al., "Reactivity of radiate pine saw wood toward carboxylic acid anhydrides," ("Dawson"). Applicants respectfully traverse the rejection.

For the reasons discussed above, Li and Vaca-Garcia fail to disclose or suggest each and every feature of claim 1. Dawson does not remedy the deficiencies of Li and Vaca-Garcia. Dawson is cited for its alleged disclosure of treating pine with carboxylic acid anhydrides. See Office Action, pages 9 to 10. However, Dawson, like Li and Vaca-Garcia, fails to disclose or suggest a method in which a lignocellulose material is treated with a mixed anhydride including a hydrocarbonaceous chain derived from a C₂ to C₄ carboxylic acid and a hydrocarbonaceous chain derived from a C₆ to C₂₄ fatty acid. Accordingly, the combination of references fails to disclose or suggest each and every feature of claim 1.

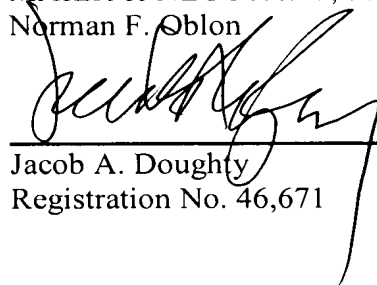
As explained, claim 1 would not have been rendered obvious by Li, Vaca-Garcia and Dawson. Claim 19 depends from claim 1 and, thus, also would not have been rendered obvious by Li, Vaca-Garcia and Mahieu. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

Conclusion

For the foregoing reasons, Applicants submit that claims 1-3, 5 and 7-19 are in condition for allowance. Prompt reconsideration and allowance are respectfully requested.

Respectfully submitted,

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A handwritten signature in black ink, appearing to read 'Jacob A. Doughty', is written over a horizontal line.

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Attachments:

Declaration Under 37 C.F.R. §1.132